3A94-15

NORTON SOUND AND KOTZEBUE SOUND MANAGEMENT AREA

SALMON CATCH AND ESCAPEMENT REPORT, 1993

By

Tracy Lingnau

Regional Information Report[1] No. 3A94-15

Alaska Department of Fish and Game
Commercial Fisheries Management and Development Division, AYK Region
333 Raspberry Road
Anchorage, Alaska 99518-1599

May 1994

---

[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate needs for up-to-date information, reports in this series may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Commercial Fisheries Management and Development Division.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

APPENDIX A - NORTON SOUND CATCH DATA

APPENDIX B - NORTON SOUND AGE AND SEX COMPOSITION

APPENDIX C - NORTON SOUND ESCAPEMENT DATA

APPENDIX D - KOTZEBUE SOUND

ABSTRACT

The 1993 commercial and subsistence harvest, and escapement samples of the five species of Pacific salmon *Oncorhynchus* found in the Norton Sound Management Area and the one species of *Oncorhynchus* found in the Kotzebue Sound Management Area in significant abundance are presented by age, sex, and length. The 1993 Norton Sound District commercial harvest totaled 263,670 salmon and was composed of 8,972 chinook *O. tschawytscha*, 53,562 chum *O. keta*, 279 sockeye *O. nerka*, 157,574 pink *O. gorbuscha* and 43,283 coho *O. kisutch* salmon. The commercial harvest was 53% above the 1988-92 average for chinook salmon, 31% below for chum salmon, 864% above for pink salmon, and 43% below for coho salmon. Sockeye salmon are only present in small numbers in this area. Aerial surveys in southern Norton Sound subdistricts indicated that escapements were above average for chinook salmon. Chum salmon in Northern Norton Sound were again low with overall escapements at 75% to 80% of the escapement goal. Southern subdistrict escapement goals varied from three times the goal in Subdistrict 4 to test net catches in Subdistrict 6 near the cumulative average. Inclement weather prevented peak escapement estimation for coho salmon in most rivers. Early surveys found good numbers of coho, therefore coho escapements were assumed to be adequate. The age composition of a small sample from the chinook salmon harvest in Subdistrict 6 was composed of three major age classes: age 1.2 (27.3%), age 1.3 (27.3%), and age 1.4 (41.0%) with smaller contributions from other age groups. Subdistrict 6 chum salmon age composition was 35.6% age 0.3 and 52.6% age 0.4. The coho salmon harvest in Subdistrict 6 was predominantly age 2.1 (84.6%). In the Kotzebue District the commercial harvest totaled 71,071 chum salmon during the normal season with an estimated 2,685 taken from the Noatak River commercial in-river fishery. An incidental catch of 55 chinook salmon and 76 Dolly Varden was also reported. Subsistence catches of these species plus whitefish, sheefish and Northern Pike also occur in the Kotzebue District. The chum salmon commercial harvest in 1993 was far below the 1979-92 average of 306,568 fish. Fair to poor escapement survey conditions prevailed in 1993. A survey of the Lower Kobuk River tributaries indicated escapement goals were met with the exception of the Squirrel River. An early survey of the Upper Kobuk indicated that the escapement goal was met. Sonar enumeration on the Noatak River indicated that the escapement likely fell short of the escapement goal may have been achieved. The age composition of the chum salmon harvest in the Kotzebue District commercial fishery was 1.4% age 0.2, 20.4% age 0.3, 73.3% age 0.4, 4.8% age 0.5, and 0.2% age 0.6.

KEY WORDS: Norton Sound, Kotzebue Sound, harvest, escapement, *Oncorhynchus tshawytscha, O. nerka, O. keta, O. kisutch, O. gorbuscha*, age-size-sex composition, fishery synopsis

INTRODUCTION

The Norton Sound, Port Clarence, and Kotzebue Sound commercial salmon management districts include all waters of Alaska from Canal Point Light, south of Stebbins, to Point Hope, north of Kotzebue. The Port Clarence District has been closed to commercial salmon fishing since 1966. The Norton Sound District includes all waters of Alaska from Canal Point Light north to Cape Douglas (Figure 1) and consists of six subdistricts: 1 (Nome), 2 (Golovin), 3 (Moses Point), 4 (Norton Bay), 5 (Shaktoolik), and 6 (Unalakleet). The Kotzebue Sound District includes all waters of Alaska from Point Hope to Cape Prince of Wales, but commercial salmon fishing is restricted to Subdistricts 1 and 2, consisting of ocean waters north of the Baldwin Peninsula (Figures 3, 4). Subdistrict 2, Noatak River mouth, normally remains closed unless the chum salmon return is substantially above average.

Five species of Pacific salmon are found in the Norton and Kotzebue Sound areas. In descending order of economic importance, i.e., average exvessel value in 1993; they are chum salmon *Oncorhynchus keta*, chinook salmon *O. tshawytscha*, coho salmon *O. kisutch*, pink salmon *O. gorbuscha*, and sockeye salmon *O. nerka*. In Norton Sound the returns of pink salmon are the largest of the five species, followed by chum, coho, chinook, and sockeye salmon. In some years the coho salmon return is greater than the chum salmon return. Because of market demand, a rare directed pink salmon fishery occurred in 1993 in Norton Sound. In the Kotzebue Sound District, chum salmon are the predominant species.

Knowledge of the magnitude, distribution, timing, and age-sex-size composition of both the harvest and escapement by stock is fundamental to managing salmon fisheries and achieving full production; i.e., salmon return strength is related to the number of fish in each age, sex, and size category of the spawning population. Age, sex, and size composition of selected harvests and escapements in the Norton and Kotzebue Sound areas have been estimated annually since 1962 and are presented in this report for 1993.

Fishery statistics for the Norton Sound and Kotzebue Sound areas are available from several additional sources. Commercial and subsistence harvest and spawning escapement data from 1961 to 1992 have been summarized in the Norton Sound - Port Clarence - Kotzebue Sound Annual Management Report (Lean et al. 1993). In addition, the results from escapement assessment projects are analyzed and reported annually. For the 1993 season these included test fishery projects on the Unalakleet River (Charlie Lean, ADF&G, personal communication) and Kobuk River (Lingnau, 1993), counting tower projects on the Kwiniuk River (Fred Bue, ADF&G, personal communication) and on the Nome River (Fred Bue, ADF&G, personal communication) and a sonar project on the Noatak River (Todd LaFlamme, ADF&G, personal communication).

Age, sex, and size data for Norton Sound and Kotzebue Sound from 1962 to 1982 are summarized in an unpublished report series entitled ADF&G Arctic-Yukon-Kuskokwim

Region Age-Sex-Size Composition of Salmon. Beginning with the 1983 season these data have been published in an annual report (Lean et al. 1984, 1992; Bigler and Lean 1986; Hamner 1987, 1989a, 1989b; Buklis 1991a, 1991b; Lingnau, 1992; Lingnau, *In Press*).

METHODS

Harvest and Escapement

Commercial catch data presented in this report were compiled from harvest receipts, i.e., *fish tickets*, which document each sale by a licensed fisherman. These data were summarized by microcomputer in the Nome and Kotzebue offices during the fishing season.

Subsistence catches have not been monitored as closely as commercial catches in the Norton Sound and Kotzebue Sound Areas. Due to budget constraints, no subsistence harvest surveys were conducted in the Norton Sound area in 1993 by Division of Commercial Fisheries. A subsistence permit is required to subsistence fish in the Nome Subdistrict, and catch limits are set by permit for each river and species. In the Kotzebue Area household interviews were conducted in the villages of Noatak, Noorvik, and Shungnak. The members of each household were asked how many fish of each species were caught for subsistence use. During these surveys it was assumed that fishermen could accurately recall their harvests, which may have occurred over several months.

The Division of Subsistence has conducted in-depth harvest interviews were conducted in the region. Studies in the city of Kotzebue in 1986 (Georgette and Loon 1993), and in the villages of Unalakleet in 1989 (Jim Magdanz, ADF&G, personal communication) and Elim in 1993 (Jim Magdanz, ADF&G, personal communication).

Aerial surveys have been the primary method for monitoring salmon escapements to the Norton Sound and Kotzebue Sound drainage's, but they do not provide a total estimate of salmon spawning abundance. Aerial survey escapement counts are, at best an index of relative abundance for the surveyed streams. To compare aerial surveys across years, surveys should be conducted on approximately the same dates each year under similar survey conditions and at the same locations. Comparing commercial catch statistics to previous years provides an index of run strength and timing. Test fishing also provides an index of escapement and species composition for turbid or large drainages that are difficult to monitor visually. Test fishery catch and catch per unit effort (CPUE) statistics are used as an index of relative abundance. Counting towers provide a better estimate of escapement. Both test fisheries and counting towers provide data on migratory timing. In 1993 a counting tower on the Kwiniuk River in the Moses Point Subdistrict, on the Nome River in the Nome Subdistrict (Appendix Table C1, C2), and a test fishing project on the

Unalakleet River in the Unalakleet Subdistrict were used to monitor escapements. A sonar escapement project on the Noatak River monitored escapements into that river and a first year test fish project on the Kobuk River was implemented in 1993 near the village of Kiana.

Age, Sex, and Length Data Collection

Age was determined from scales removed from the left side of the fish in an area above the lateral line crossed by a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin. Scales were mounted on gum cards and impressions made in cellulose acetate. Ages were reported in European notation (the first digit refers to the freshwater age and does not include the year spent in the gravel; the second digit refers to the ocean age). Sex was determined by examining external characteristics, such as; snout, vent, body symmetry, extruded eggs, ovipositor or milt of live fish. The sex of dead fish was determined by examining the gonads, if necessary. Fish length to the nearest millimeter was measured from mid-eye to fork-of-tail.

In some cases sex and length data but no ageable scales were obtained from fish, and in other cases ageable scales were collected without corresponding sex or length data. Therefore, numbers of fish in a length-by-age summary table may differ from numbers of fish in a sex-by-age summary table for a given fishery or escapement sample.

Sample Size

Minimum sample size goals were established for temporal strata based upon interval estimation of age class composition. The ages of fish were categorized into three age classes for this purpose: age 4, age 5, and age 3 or age 6. Sample sizes were chosen such that the width of 95% confidence intervals (Goodman 1965; Bromaghin 1991) for the proportion of the harvest in each of the three age categories would not exceed 0.15 (Jeff Bromaghin, ADF&G, personal communication). A sample of approximately 250 fish per stratum satisfied this objective. However, sample sizes were increased to 280 fish per stratum to account for the expected number of unreadable scales.

RESULTS

Enough commercial fishery samples were collected to estimate age and sex composition of the harvest for chinook, chum and coho salmon in Norton Sound Subdistrict 6 and for the chum harvest in the Kotzebue District. Chinook, chum, and coho salmon were sampled from the Unalakleet River set gillnet test fishing catch. Because of the selectivity of the 5-7/8-in (149-mm) stretched-mesh gillnets used on the test net project, the samples are not an unbiased source of spawning escapement age, sex, and size composition. Kotzebue Sound chum salmon escapement carcass samples were collected from the Squirrel and Salmon Rivers in the Kobuk River drainage. Comparisons of age, sex, and size composition were not substantiated by statistical testing.

Norton Sound

Commercial and Subsistence Harvest

The 1993 Norton Sound commercial harvest totaled 263,670 salmon and was composed of 8,972 chinook, 53,562 chum, 279 sockeye, 157,574 pink, and 43,283 coho salmon (Table 1; Appendix A). Subdistrict 5 accounted for 54.1% of the total salmon harvest in 1993, followed by Subdistrict 6 (39.0%) and Subdistrict 2 (4.3%). Fishing effort was slightly above the recent 10 year average. With low expectations of chum salmon and low prices, effort normally drops. In 1993 however, the higher effort was possibly due to a seldom directed pink salmon fishery.

Fishermen in the Unalakleet (6) and Shaktoolik (5) Subdistricts target on chinook salmon from the opening of the season in the first part of June until mid-June using set gillnets with 8-1/4 in (210 mm) stretched mesh. Initial catches of chinook salmon indicated a good return. Test fish indices and subsistence interviews in the southern subdistricts supported those indications. Northern subdistricts indicated an average return of chinook salmon. North of the Shaktoolik Subdistrict, fishermen typically use 5-7/8 in mesh gillnets throughout the fishing season to target on chum salmon and take chinook salmon incidentally. In Norton Sound chum salmon is normally the most important species economically, i.e., has the highest exvessel value. In 1993, however, a strong return of chinook salmon and poor return of chum salmon resulted in chinook accounting for 33.9% of the exvessel value. The rare directed pink salmon fishery resulted in 59.8% of the total Norton Sound harvest and 19% of the exvessel value. Although chinook salmon returns were strong and a directed pink salmon harvest occurred, the 1993 exvessel value for Norton Sound was the lowest since 1976. Sockeye salmon are harvested in small numbers incidentally during the chum fishery: 296 were caught in 1993. Two shore based operators purchased fish in Norton Sound. A third major buyer operated a processing vessel with two large tenders purchasing fish throughout Norton Sound. There were also several

catcher/sellers marketing fresh salmon locally and to wholesale distributors.

The Norton Sound commercial fishing season typically begins between June 8 and June 20. Because of chum salmon conservation concerns, Subdistrict 1 did not open until August 2, Subdistrict 2 did not open until July 13, and Subdistrict 3 did not open until August 6. Subsistence and sport fishing was also curtailed by similar action in Subdistrict 1. Because of expected poor chum salmon returns in the northern subdistricts, restrictions were also set for Subdistricts 2 and 3. A single catcher/seller operated in Subdistrict 1 targeting coho salmon. Nine 24-h periods were opened but prohibitive weather conditions only allowed the fisherman to operate 4 of the 9 openings. A buyer wanting to operate in Subdistrict 2 was only interested in purchasing pink salmon. The department allowed 3 commercial periods with mesh sizes restricted to 4-1/2 in (114 mm) so pink salmon could be targeted. The allowable chum salmon harvest for Subdistrict 2 was limited to 10,000 fish. The last period was on July 22 at which time the processing vessel departed Norton Sound and the season remained closed because of a lack of market. Because of decreased chum salmon returns in past years, there was little expectation for a fishery directed at chum salmon. A buyer expressed interest in a coho directed fishery. Coho salmon returns were expected to be average and the first period occurred on August 6. The fishery appeared feasible and 3 more periods were coordinated to accommodate the buyer's schedule, with the final period on August 27. Subdistrict 4 has had difficulties in the past attracting a buyer because of it's remoteness and reputation for water marked fish. A buyer expressed interest in special periods for Subdistrict 4. Chum salmon returns had been adequate and there was no reason why a limited harvest could not occur. The first period occurred on June 18 for 24 hours. Run strength was adequate but fish quality was a problem. A second period occurred on June 26 to check the quality and the fish were found to be marketable. Two additional periods were allowed with the final period occurring on July 5.

Subdistricts 5 and 6 are managed similar to each other. Some periods differ in opening times to accommodate the buyers so they may coordinate operations with their tenders and flight schedules. Both subdistricts were opened on June 14 with unrestricted mesh size. Comparative catch rates indicated good chinook salmon run strength. Fishing periods were extended to 48 h twice weekly for both subdistricts. On July 11, both subdistricts opened for a 36 h fishing period with a 4-1/2 in mesh size restriction and a reduced fishing area. These restrictions allowed for maximizing pink salmon harvest while conserving chum salmon for escapements. The last two fishing periods in July were closed to boost chum salmon escapement. The standard fishing schedule resumed in August to target coho salmon. The remaining buyer in Subdistrict 5 ceased operations in the subdistrict on August 24. Fishing in Subdistrict 6 continued until the season closed on September 8.

Although many of the 13,000 residents of the Norton Sound Area are dependent to some extent on the fish and game resources of the area, subsistence salmon catches have not been monitored since 1983 except in the Nome Subdistrict. Prior to 1983 the Department conducted annual household surveys in many of the villages. For the last 5 years in which thorough surveys were conducted, 1978-1982, the average annual subsistence catch in the

Norton Sound area was 73,000 salmon for all species combined. Because not all fishermen were contacted, this should be considered a minimum estimate. Subsistence Division reported a salmon harvest for the village of Elim of 4,948 in 1993, of which 1,635 were chum salmon. In the Nome Subdistrict, subsistence permits require that fishermen document their harvest by species. There were 141 subsistence permits issued in 1993 (Table 2). A total of 74 permit holders fished; they reported a harvest of 4,841 salmon composed of 52 chinook, 1,766 chum, 873 pink, 80 sockeye, and 2,070 coho salmon (Table 2).

Escapement Abundance

Subdistricts 5 and 6 support the largest chinook salmon returns in Norton Sound. Subdistricts 1, 2, 3, and 4 have had increasing returns in recent years. Escapement surveys and subsistence catches indicated above-average numbers of chinook salmon in Subdistricts 4, 5 and 6. The Unalakleet River test fish project also indicated an above average chinook salmon escapement.

Chum salmon escapement abundance in Norton Sound was generally near or below the desired levels, despite the restrictive management actions taken for conservation. Tributaries in subdistricts 1 and 3 were roughly 80% of the goal (Table 3). Surveys in Subdistrict 2 indicated an overall adequate escapement. A survey of the Ungalik River in subdistrict 4 escapements was an exception in that it was three times the goal for chum salmon. Chum salmon indicators for Subdistricts 5 and 6 indicated either low or late escapements. Poor weather prevented peak surveys, however, test net catches for the Unalakleet River were near the cumulative average and it was assumed that the chum salmon escapement, even though late, was probably near the desired level.

Because of inclement weather during the coho migration, most aerial surveys were conducted under poor conditions. Peak coho salmon aerial surveys on some tributaries were not attempted because of unfavorable conditions. Surveys completed early indicated that coho salmon escapements were adequate throughout Norton Sound. Surveys in Subdistrict 3 indicated good escapements and concurred with the high catch rates in that subdistrict.

Pink salmon escapements follow an odd/even year cycle with the even years several times the escapement level of the odd years. Poor weather conditions persisted throughout the district and adequate surveys were only available in Subdistricts 4 and 5.

Age, Sex, and Length Composition

A sample of the chinook salmon commercial harvest in Subdistrict 6 was composed of 41.0% age-1.4, 27.3% age-1.3, 27.3% age-1.2, and 2.9% age-1.5 fish. The sample consisted of 39.6% females and 60.4 % males. A sample of 83 chinook salmon from the Unalakleet River test fishery was 53.0% age 1.2, 26.5% age 1.3, and 20.5% age 1.4 with 31.3% of the

total being female. Mean lengths by age group for all samples collected ranged from 554 mm for age-1.2 males from to 1,095 mm for an age-1.5 male, both from the Subdistrict 6 commercial fishery sample (Tables 4, 5).

Subdistrict 6 chum salmon age composition was mostly age 0.4 (52.6%), followed by age 0.3 (35.6%). Females composed 49.7% of the total. A sample of 324 chum salmon from the Unalakleet River test fishery was 49.4% age 0.4 and 36.7% age 0.3, and 34.0% of the sample was female. A small sample of 68 fish from subsistence harvest on the Kwiniuk River was 58.8% age 0.4, 16.2% being female. Mean lengths by age group for all samples collected ranged from 510 mm for an age-0.3 female from Subdistrict 6 to 608 mm for age-0.5 males from the Unalakleet River test fishery sample (Tables 6, 7, 8). Samples through time indicated there was little variation of age composition with 5-year-old fish dominating throughout the season (Appendix Table B1, B2).

Subdistrict 6 coho salmon samples were dominated by age-2.1 fish with 84.6% with 39.8% females. There were 116 coho salmon sampled from in the Unalakleet River test fishery and the age composition was similar to the Subdistrict 6 catch: 81.9% age-2.1 salmon, followed by age-1.1 (17.2%). Mean lengths by age group for all samples collected ranged from 530 mm for age-1.1 males from Subdistrict 6 to 620 mm for an age-1.1 female in the Unalakleet River test fishery (Tables 9, 10).

Kotzebue Sound

Commercial and Subsistence Harvest

The 1993 commercial harvest in the Kotzebue District totaled 71,071 chum salmon in the normal season and an estimated 2,685 in an experimental roe fishery at Sikusuilaq Hatchery. There was an incidental harvest of 55 chinook salmon and 76 Dolly Varden in the normal season commercial fishery (Tables 11, 12). The chum salmon harvest was 77% below the 1979-92 average of 306,000 fish, the lowest commercial catch since 1969. Gear was limited to set nets having an aggregate length of no more than 150 fathoms (274 m) per fisherman. Most fishermen operated with one end on or near shore and with all three shackles connected. Most gear used in the district is 5-7/8 in stretch multi-filament gillnet.

The Kotzebue Sound commercial season began on July 8. The first three periods were 24 h in duration with harvest rates near the recent 14-year average. With average catch rates, Periods 4 and 5 were conducted in the usual manner. Catch rates of periods 4 and 5 dropped to 80% and 60% of normal. Four year old fish normally comprise the bulk of the fishery, however during this portion of the fishery, they were about 70% below average. Because of the low catch rates and a lack of 4-year-olds, period closures were necessary to conserve chums for escapement.

Period 6 was closed and period 7 was open to re-evaluate the age composition of the run. The catch rate was average. However, because of the still alarming low number of age-4 fish, period 8 was closed. The period 9 harvest was comprised of only 22% 4-year-old fish, as compared to the normal 65%. Catch rates were nearly twice normal but the bulk of the fish were caught from interior statistical areas (1 and 4), and it was thought that most fish caught were milling. Few fish were caught at the outer areas (2, 5 and 6). Noatak River daily sonar counts through the first week of August were below the 1991 and 1992 levels the aerial survey when escapement goal was just met. With the lack of 4-year-old fish and low sonar counts, the district was closed to commercial fishing effective August 7. Commercial fishermen were contracted by the department to test fish during closed periods to track age composition during the closed periods.

Door-to-door interviews with subsistence fishermen were conducted in the villages of Noorvik and Shungnak on the Kobuk River and in the village of Noatak on the Noatak River. Partial estimates of chum salmon subsistence harvests totalled 8,430 in Noorvik, 3,730 in Shungnak, and 3,270 in Noatak (Table 13). These do not represent the total subsistence harvest estimates for the Kotzebue Sound area because (1) the harvests were not expanded to estimate for households not interviewed, and (2) Kotzebue and the majority of other communities which harvest chum salmon for subsistence use were not surveyed.

Sikusuilaq Springs Hatchery Terminal Fishery

Sikusuilaq Springs Hatchery is located on the Noatak River 63 km upstream from the mouth. The hatchery was built in 1982 and currently has a capacity of 10,000,000 eggs. The bulk of the hatchery stock migrates through the Kotzebue District the last three weeks of August. Because of the commercial fishery closure, hatchery fish would not be harvested as they normally are during the commercial season. With excess fish returning to the hatchery, it was felt these fish should be harvested. The Northwest Arctic Borough conducted a public process which favored a commercial fishery to harvest these excess chum salmon. A bidding process occurred with the stipulation that the bid price would be shared equally by all participating permit holders during the 1993 season. Only one buyer returned a completed bid form to the borough.

The department wrote an emergency regulation followed by an emergency order to allow beach seining and to open the lower Noatak River to commercial fishing by field announcement. Fishing commenced September 9 for approximately 1 week. Roe quality for those fish were poor and the wholesaler declined further product. A second wholesaler was found and fishing occurred during the second and third week of October. Fishing ceased when winter weather and freeze-up conditions began. In all, 1,620 females were sold. Males in the catch were approximately 40% bringing the total estimated commercial harvest to 2,685 chum salmon (Table 12).

Escapement Abundance

Poor to fair conditions existed during 1993 for aerial escapement surveys in the Kotzebue District. Early and peak surveys conducted on the Lower Kobuk tributaries indicated average chum salmon run strength (Table 14). Only one survey (pre-peak) with fair conditions occurred on the Upper Kobuk and indicated that the escapement goal was met. A single survey for the Noatak River was attempted under poor conditions, and resulting survey count was less than half of the escapement goal. The sonar project indicated that the escapement likely fell short of the desired goal.

Age, Sex, and Length Composition

Sufficient commercial fishery catch samples were collected to stratify the season by fishing period (Appendix D.1). In 1994 there was an age class failure for 4-year-old fish. Normally a shift in age composition through the season occurs with age 0.4 decreasing and age 0.3 increasing as the season progresses. This year no real age class shift occurred and age 0.4 fish dominated for the duration of the season. For 1993, age-0.2 and age-0.5 fish typically contribute only a small percentage each year. For 1993, age-0.2 fish composed less than one-third of the typical contribution for the season. The chum salmon commercial harvest for the season was composed of a weighted average of 1.4% age 0.2, 20.4% age 0.3, 73.3% age 0.4, 4.8% age 0.5, and 0.2% age 0.6 (Table 15). Age composition for chum salmon caught in the commercial test nets was 4.8% age 0.2, 34.6% age 0.3, 58.6% age 0.4 and 2.0% age 0.5 (Appendix Table D.1). The combination of all samples consisted of 2.9% age 0.2 fish, 26.3% age 0.3, 66.4% age 0.4, 4.2% age 0.5, and 0.2% age 0.6. The ratio for males and females were nearly equal in all samples.

Sample sizes from the Kobuk River test fish and the Noatak River test fish projects were sufficient to stratify into time periods (Appendix Table D.2, D.3). Overall, chum salmon age composition for both projects were fairly similar with about 60% age 0.4 and 30% age 0.3 with smaller quantities of age 0.2 and 0.5 fish. The Noatak River sample, as in the commercial catch and test nets, had a small percentage of 0.6 year old fish. Fish of this age are usually insignificant and not reported, however, in 1994 there seemed to be more older fish than usual (Table 16).

Spawning ground samples were collected for chum salmon from the Squirrel and Salmon Rivers of the Kobuk River drainage. Age composition ranged from 18.3% to 54.5% for age 0.3 and from 42.9% to 75.1% for age 0.4. Mean lengths by age group for all escapement samples including Noatak River and Kobuk River test fish ranged from 525 mm for age-0.2 females from the Squirrel River to 700.8 mm for age-0.6 males in the Kotzebue commercial samples (Tables 15, 16,17).

LITERATURE CITED

Bigler, B. S., and C. F. Lean. 1986. Age, sex, and size of Norton Sound and Kotzebue Sound salmon catch and escapement, 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 172, Juneau.

Bromaghin, J. F. 1991. A note on constructing simultaneous confidence intervals about multinomial probabilities. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A91-23, Anchorage.

Buklis, L. S. 1991a. Abundance, age, sex, and size of Norton Sound and Kotzebue Sound salmon catch and escapement, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fisheries Report 91-02, Juneau.

Buklis, L. S. 1991b. Abundance, age, sex, and size of Norton Sound and Kotzebue Sound salmon catch and escapement, 1989. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fisheries Report 91-03, Juneau.

Georgette, S. and Loon, H. 1993. Subsistence use of fish and wildlife in Kotzebue, A Northwest Alaska Regional Center. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 167, Juneau.

Goodman, L. A. 1965. On simultaneous confidence intervals for multinomial proportions. *Technometrics* 7, 247-254.

Hamner, H. H. 1987. Abundance, age, sex, and size of Norton Sound and Kotzebue Sound salmon catch and escapement, 1985. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 193, Juneau.

Hamner, H. H. 1989a. Abundance, age, sex, and size of Norton Sound and Kotzebue Sound salmon catch and escapement, 1986. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fisheries Report 89-08, Juneau.

Hamner, H. H. 1989b. Abundance, age, sex, and size of Norton Sound and Kotzebue Sound salmon catch and escapement, 1987 Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Fisheries Report 89-09, Juneau.

Lean C. F., B. B. Bigler, and L. K. Brannian. 1984. Age, sex, and size of Norton Sound and Kotzebue Sound salmon catch and escapement, 1983. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 130, Juneau.

Lean, C. F., F. J. Bue, T. L. Lingnau. 1993. Norton Sound-Port Clarence-Kotzebue Sound Annual Management Report, 1992. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A93-15, Anchorage.

Lingnau, T. L. 1992. Norton Sound and Kotzebue Sound Management Area Salmon Catch and Escapement Report, 1991. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Technical Fisheries Report 92-13, Juneau.

Lingnau, T. L. *In Press*. Norton Sound and Kotzebue Sound Management Area Salmon Catch and Escapement Report, 1992. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Technical Fisheries Report, Juneau.

Lingnau, T. L. 1993. Kobuk River Test Fishing Project, 1993. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 3A93-20, Anchorage.

Table 1. Norton Sound commercial salmon effort, catch and weight (pounds) by subdistrict, 1993.

Subdistrict	Number of Fishermen [a]	Chinook		Sockeye		Coho		Pink		Chum		Total	
		No. Fish	Weight	No. Fish	Weight	No. Fish	Weight	No. Fish	Weight	No. Fish	Weight	No. Fish	Weight
1	1	0	0	0	0	611	4,576	0	0	132	879	743	5,455
2	8	1	2	4	22	2	12	8,480	21,780	2,803	13,439	11,290	35,255
3	26	3	31	4	24	4,065	21,522	0	0	167	845	4,239	22,422
4	15	267	5,339	0	0	0	0	290	1,125	1,378	10,219	1,935	16,683
5	37	2,757	46,439	20	138	12,315	83,249	106,743	277,532	20,926	133,946	142,761	541,304
6	66	5,944	99,693	251	1,892	26,290	178,343	42,061	106,383	28,156	187,744	102,702	574,055
District Totals	153	8,972	151,504	279	2,076	43,283	287,702	157,574	406,820	53,562	347,072	263,670	1,195,174

[a] Some fishermen fished more than one subdistrict.

Table 2. Norton Sound subsistence salmon catch and effort in the Nome area, 1993.

Location	Permits Issued [a]	Permits Returned	Permits Fished	Chinook	Sockeye	Chum	Pink	Coho	Total
Marine Waters	68	58	36	48	43	1,610	202	869	2,772
Nome River	24	19	12	0	7	55	442	229	733
Snake River	6	6	6	2	0	17	11	81	111
Eldorado	11	10	8	1	3	32	2	346	384
Flambeau	5	4	4	0	1	8	2	224	235
Bonanza River	6	5	2	0	1	10	5	49	65
Solomon River	5	5	3	0	0	1	190	0	191
Sinuk River	2	1	0	0	0	0	0	0	0
Fish River	1	1	1	0	0	8	0	272	280
Port Clarence	2	2	2	1	25	25	19	0	70
Pilgrim River	8	4	0	0	0	0	0	0	0
Unknown River	3	0	0	0	0	0	0	0	0
Totals [c]	141	115	74	52	80	1,766	873	2,070	4,841

[a] Permits issued by Alaska Department of Fish and Game, Division of Commercial Fisheries, in Nome.
[b] Includes the Kuzitrin and Pilgrim Rivers.
[c] Preliminary data.

Table 3. Norton Sound salmon aerial survey escapement counts by species for 1993 including survey count objectives for chum salmon.

Location or Subdistrict	River / Lake	Chinook	Coho	Sockeye	Pink [a]	Chum	
						Count	Goal
Port Clarence	Salmon L.			3,101			
1	Glacial L.			419			
	Sinuk R.	7	104	30	5,120	1,570	4,500
	Snake R.					317	1,000
	Nome R.	56 [b]	3,061 [b]		9,212 [b]	1,520	2,000
	Flambeau R.					1,590	3,250
	Eldorado R.	38	110		120	2,885	5,250
	Bonanza R.		510				1,500
	Solomon R.		128		900	415	550
2	Fish R.	48			13,440	12,695	17,500
	Boston C.	227			1,930	4,513	2,500
	Niukluk R.	15	2,104		2,840	19,910	8,000
	Ophir C.		14				
3	Kwiniuk R.	565 [b]	1,238		43,065 [b]	15,823 [b]	19,500 [c]
	Tubutulik R.	1,061	1,395		18,650	8,740	12,000
4	Inglutalik R.						8,500
	Ungalik R.	156			66,120	10,180	2,500
5	Shaktoolik R.	712			85,320	5,515	11,000
	Unalakleet R.	253					
6	North R.	900	1,397		13,570	445	2,000
	Old Woman R.	387					100
	Kogok R.		115		70	70	
	Pikmiktalik R.		525			150	

[a] Species identification difficult where large numbers of pink salmon were observed.
[b] Preliminary expanded tower counts.
[c] Chum goal is for tower count.

Table 4. Norton Sound Subdistrict 6 chinook salmon commercial catch sample age and sex composition, and mean length, 1993.

		Brood Year and (Age Group)						
		1989	1988	1987		1986		
		(1.2)	(1.3)	(1.4)	(2.3)	(1.5)	(2.4)	Total
Stratum Dates:	06/14 – 09/08							
Sampling Dates:	06/15 – 06/22							
Sample Size:	139							
Female	Percent of Sample	2.2	8.6	25.2	0.7	2.2	0.7	39.6
	Number in Catch	128	513	1,497	43	128	43	2,352
	Mean Length (mm) [a]	608.3	766.0	866.3	780.0	867.3	870.0	
	Standard Error	16.4	22.8	7.2	0.0	6.5	0.0	
Male	Percent of Sample	25.2	18.7	15.8	0.0	0.7	0.0	60.4
	Number in Catch	1,497	1,112	941	0	43	0	3,592
	Mean Length (mm) [a]	554.2	726.6	845.5		1095.0		
	Standard Error	7.7	13.1	13.6		0.0		
Total	Percent of Sample	27.3	27.3	41.0	0.7	2.9	0.7	100.0
	Number in Catch	1,625	1,625	2,437	43	171	43	5,944
	Standard Error	226	226	249	43	85	43	

[a] Length was from mid–eye to fork–of–tail.

Table 5. Unalakleet River chinook salmon test fish age and sex composition and mean length, 1993.

		Brood Year and (Age Group)			
		1989 (1.2)	1988 (1.3)	1987 (1.4)	Total
Stratum Dates:	6/08 – 7/13				
Sampling Dates:	6/10 – 8/30				
Sample Size:	83				
Female	Percent of Sample	6.0	9.6	15.7	31.3
	Number in Catch	5	8	13	26
	Mean Length (mm) [a]	661.0	696.0	829.6	
	Standard Error	36.4	20.9	7.1	
Male	Percent of Sample	47.0	16.9	4.8	68.7
	Number in Catch	39	14	4	57
	Mean Length (mm) [a]	561.1	682.5	873.8	
	Standard Error	4.8	19.4	44.3	
Total	Percent of Sample	53.0	26.5	20.5	100.0
	Number in Catch	44	22	17	83
	Standard Error	5	4	4	

[a] Length was from mid–eye to fork–of–tail.

Table 6. Norton Sound Subdistrict 6 chum salmon commercial catch age and sex composition, and mean length, 1993.

		Brood Year and Age Group				
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	Total
Stratum Dates:	6/14 – 9/08					
Sampling Dates:	6/30 – 8/09					
Sample Size:	441					
Female	Percent of Sample	0.2	15.9	26.5	7.0	49.7
	Number in Catch	1	70	117	31	219
	Mean Length (mm) [a]	510.0	555.7	570.6	581.8	
	Standard Error	0.0	3.1	2.5	5.2	
Male	Percent of Sample	0.2	19.7	26.1	4.3	50.3
	Number in Catch	1	87	115	19	222
	Mean Length (mm) [a]	535.0	574.8	581.5	602.4	
	Standard Error	0.0	3.0	2.6	5.2	
Total	Percent of Sample	0.5	35.6	52.6	11.3	100.0
	Number in Catch	2	157	232	50	441
	Standard Error	1	10	10	7	

[a] Length was from mid–eye to fork–of–tail.

Table 7. Unalakleet River chum salmon test fish catch age and sex composition, and mean length, 1993.

		Brood Year and (Age Group)				
		1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	6/08 – 9/02					
Sampling Dates:	6/08 – 9/02					
Sample Size:	324					
Female	Percent of Sample	9.0	17.3	7.4	0.3	34.0
	Number in Catch	29	56	24	1	110
	Mean Length (mm) [a]	560.4	579.3	593.8	590.0	
	Standard Error	4.9	3.7	5.1	0.0	
Male	Percent of Sample	27.8	32.1	6.2	0.0	66.0
	Number in Catch	90	104	20	0	214
	Mean Length (mm) [a]	585.9	594.6	608.3		
	Standard Error	3.0	2.7	7.1		
Total	Percent of Sample	36.7	49.4	13.6	0.3	100.0
	Number in Catch	119	160	44	1	324
	Standard Error	9	9	6	1	

[a] Length was from mid–eye to fork–of–tail.

Table 8. Kwiniuk River chum salmon subsistence beach seine catch age and sex composition, and mean length, 1993.

		Brood Year and (Age Group)			
		1989 (0.3)	1988 (0.4)	1987 (0.5)	Total
Stratum Dates:	7/03 – 7/14				
Sampling Dates:	7/03 – 7/14				
Sample Size:	68				
Female	Percent of Sample	2.9	13.2	0.0	16.2
	Number in Catch	2	9	0	11
	Mean Length (mm) [a]	544.5	551.9		
	Standard Error	17.5	8.8		
Male	Percent of Sample	35.3	45.6	2.9	83.8
	Number in Catch	24	31	2	57
	Mean Length (mm) [a]	544.5	582.1	555.5	
	Standard Error	5.1	6.5	4.5	
Total	Percent of Sample	38.2	58.8	2.9	100.0
	Number in Catch	26	40	2	68
	Standard Error	4	4	1	

[a] Length was from mid–eye to fork–of–tail.

Table 9. Norton Sound Subdistrict 6 coho salmon commercial catch sample age and sex composition, and mean length, 1993.

		Brood Year and (Age Group)			
		1990 (1.1)	1989 (2.1)	1988 (3.1)	Total
Stratum Dates:	6/14 – 9/08				
Sampling Dates:	8/06 – 8/16				
Sample Size:	123				
Female	Percent of Sample	3.3	35.8	0.8	39.8
	Number in Catch	4	44	1	49
	Mean Length (mm) [a]	563.8	557.0	570.0	
	Standard Error	5.9	4.3	0.0	
Male	Percent of Sample	8.9	48.8	2.4	60.2
	Number in Catch	11	60	3	74
	Mean Length (mm) [a]	530.0	563.6	573.3	
	Standard Error	14.8	3.9	27.4	
Total	Percent of Sample	12.2	84.6	3.3	100.0
	Number in Catch	15	104	4	123
	Standard Error	4	4	2	

[a] Length was from mid–eye to fork–of–tail.

Table 10. Unalakleet River coho salmon test fish catch age and sex composition, and mean length, 1993.

		Brood Year and (Age Group)			
		1990 (1.1)	1989 (2.1)	1988 (3.1)	Total
Stratum Dates:	7/26 – 9/08				
Sampling Dates:	7/26 – 9/08				
Sample Size:	116				
Female	Percent of Sample	6.9	41.4	0.0	48.3
	Number in Catch	8	48	0	56
	Mean Length (mm) [a]	586.3	571.4		
	Standard Error	8.1	4.2		
Male	Percent of Sample	10.3	40.5	0.9	51.7
	Number in Catch	12	47	1	60
	Mean Length (mm) [a]	573.3	584.8	620.0	
	Standard Error	6.8	6.0	0.0	
Total	Percent of Sample	17.2	81.9	0.9	100.0
	Number in Catch	20	95	1	116
	Standard Error	4	4	1	

[a] Length was from mid–eye to fork–of–tail.

Table 11. Kotzebue District commercial catch, weight, and average weight of chum salmon, chinook salmon, and Dolly Varden by period, 1993.

Period	Dates	Hours	Number of Fishermen	Chum			Chinook			Dolly Varden		
				Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.
1	7/08–7/09	24	24	2,027	17,308	8.5	1	17	17.0			
2	7/12–7/13	24	44	4,285	37,273	8.7	8	148	18.5			
3	7/15–7/16	24	55	8,205	71,345	8.7	15	246	16.4			
4	7/19–7/20	24	62	7,572	64,962	8.6	4	73	18.3			
5	7/22–7/23	24	79	7,659	67,533	8.8	10	193	19.3			
6	Closed Period											
7	7/29–7/30	24	79	14,309	121,565	8.5	6	120	20.0			
8	Closed Period											
9	8/05–8/06	24	88	27,014	222,822	8.2	11	170	15.5	76	540	7.1
10	Closed Period											
11	Closed Period											
12	Closed Period											
13	Closed Period											
14	Closed Period											
15	Closed Period											
Totals	7/09–8/06	168	114	71,071	602,808	8.5	55	967	17.6	76	540	7.1

Table 12. Noatak River commercial inriver fishery estimated catch, 1993.

Dates	Female		Male [a]		Total [a]	
	Number	Pounds	Number	Pounds	Number	Pounds
9/09/93 – 9/13/93	744	6,699	446	4,018	1,240	11,160
10/09/93 – 10/16/93	867	7,880	520	4,682	1,445	13,005
Total	1,611	14,579	967	8,699	2,685	24,165

[a] Estimated contribution of males.
[b] Skein weight samples taken at hatchery averaged 2 lbs. of roe per female.

Table 13. Partial estimates of subsistence harvest of chum salmon, Dolly Varden, whitefish, sheefish and Northern Pike in the Kotzebue Area villages of Noatak, Noorvik, and Shungnak, 1993.

Village	Number of Households Interviewed That Fished	Total Household Members	Average Members per Household	Number of Fish				
				Chum Salmon	Dolly Varden	Whitefish	Sheefish	Northern Pike
Noatak	24	123	5	3,270	4,275	1,760		
Noorvik	27	160	6	8,430	60	11,950	1,470	3,145
Shungnak	19	86	5	3,730		5,350	971	
Total [a]	70	369	5	15,430	4,335	19,060	2,441	3,145

[a] Subsistence catch estimates represent only households interveiwed that fished.

Table 14. Kotzebue District chum salmon aerial survey escapement estimates for primary index streams, 1980–1993. Indices listed in this table are the peak survey observed for each tributary during the given year.

Stream	Aerial Escapement Goal	1980	1981 [a]	1982 [a]	1983	1984	1985 [a]	1986 [a]	1987 [a]	1988 [a]	1989 [b]	1990 [a]	1991	1992 [a]	1993 [a]
Kobuk Drainage	30,500	34,629	24,325	25,557	44,175	18,697	20,420	17,225	14,457	26,073		29,465	36,390	17,075	30,873
Squirrel R.	11,500	13,536	9,854	7,690	6,115	5,473	6,160	4,982	2,708	4,848		5,500	4,606	2,765	4,463
Salmon R.	7,000	8,456	4,709	1,871	1,677	1,471	2,884	1,971	3,333	6,208		6,335	5,845	1,345	13,880
Tutuksuk R.	2,000	1,165	1,114	1,322	2,637	1,132	5,098	4,257	206	3,122		2,275	744	1,162	1,196
Upper Kobuk	10,000	11,472	8,648	14,674	33;746	10,621	6,278	6,015	8,210	11,895		15,355	25,195	11,803	11,334
Noatak Drainage	80,000	182,167	130,122	32,475	94,954	76,399	45,580	42,424	9,245	56,029		27,015	86,344	36,771	35,014
Noatak R.	80,000	164,474	116,352	20,682	79,773	67,873	43,525	37,277	5,515	45,930		23,685	82,750	34,335	30,210
Eli R.		10,277		189	3,044	5,027	855	4,308	2,780	8,639		3,000	2,940	1,710	4,795
Kelly R. & Lake		7,416	13,770	11,604	12,137	3,499	1,200	839	950	1,460		330	654	726	9
Inmachhuk R.					9,131	12,737									

[a] Poor or incomplete survey.
[b] No survey due to poor weather conditions.

Table 15. Kotzebue District chum salmon commercial catch age and sex composition, and mean length, 1993.

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	7/08–8/27						
Sampling Dates:	7/09–8/27						
Sample Size:	1,870						
Female	Percent of Sample	0.5	8.6	36.2	2.5	0.1	47.7
	Number in Catch	328	6,085	25,722	1,752	46	33,933
	Mean Length (mm) [a]	572.0	597.1	609.8	620.0	625.0	
	Standard Error	14.8	2.5	1.0	3.4	6.0	
Male	Percent of Sample	0.9	11.8	37.1	2.3	0.2	52.3
	Number in Catch	633	8,398	26,347	1,633	127	37,138
	Mean Length (mm) [a]	588.9	619.2	633.3	640.6	700.8	
	Standard Error	14.3	2.5	1.3	5.2	14.9	
Total	Percent of Sample	1.4	20.4	73.3	4.8	0.2	100.0
	Number in Catch	961	14,483	52,068	3,385	173	71,071
	Standard Error	190	662	728	350	81	

[a] Length was from mid–eye to fork–of–tail.

Table 16. Kobuk River and Noatak River chum salmon test fish catch age and sex composition, and mean length, 1993.

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	7/12 – 8/12	Kobuk River					
Sampling Dates:	7/12 – 8/12						
Sample Size:	462						
Female	Percent of Sample	0.6	14.5	30.5	1.7		47.4
	Number in Catch	3	67	141	8		219
	Mean Length (mm) [a]	556.7	580.0	594.3	623.1		
	Standard Error	17.6	3.1	2.3	11.8		
Male	Percent of Sample	1.1	14.3	35.5	1.7		52.6
	Number in Catch	5	66	164	8		243
	Mean Length (mm) [a]	565.0	611.1	624.2	629.3		
	Standard Error	6.9	4.8	2.7	12.3		
Total	Percent of Sample	1.7	28.8	66.0	3.5		100.0
	Number in Catch	8	133	305	16		462
	Standard Error	3	10	10	4		
Stratum Dates:	7/24 – 9/13	Noatak River					
Sampling Dates:	7/24 – 9/13						
Sample Size:	956						
Female	Percent of Sample	2.9	19.7	34.0	0.6	0.1	57.4
	Number in Catch	28	188	325	6	1	549
	Mean Length (mm) [a]	539.1	557.7	571.6	562.3	650.0	
	Standard Error	5.1	2.3	1.9	12.8	0.0	
Male	Percent of Sample	1.9	14.6	24.8	1.2	0.2	42.6
	Number in Catch	18	139	237	11	2	407
	Mean Length (mm) [a]	541.8	581.1	604.2	624.5	652.0	
	Standard Error	6.2	3.0	2.4	9.6	24.0	
Total	Percent of Sample	4.8	34.2	58.8	1.8	0.3	100.0
	Number in Catch	46	327	563	17	3	956
	Standard Error	7	15	15	4	2	

[a] Length was from mid–eye to fork–of–tail.

Table 17. Kotzebue District chum salmon tributary escapement age and sex composition, and mean length, 1993.

		Brood Year and (Age Group)				
		1989 (0.2)	1988 (0.3)	1987 (0.4)	1986 (0.5)	Total
Squirrel River [a,b]						
Sampling Dates:						
Sample Size:	157					
Female	Percent of Sample	1.9	31.4	22.4	0.0	55.8
	Number in Sample	86	1,402	1,001	0	2,489
	Mean Length (mm) [c]	525.0	549.6	550.6		
	Standard Error	20.8	4.5	4.6		
Male	Percent of Sample	0.0	23.1	20.5	0.6	44.2
	Number in Sample	0	1,030	915	29	1,974
	Mean Length (mm) [c]		586.4	603.4	585.0	
	Standard Error		5.3	7.1	0.0	
Total	Percent of Sample	1.9	54.5	42.9	0.6	100.0
	Number in Sample	86	2,432	1,917	29	4,463
	Standard Error	49	178	177	29	
Salmon River [a,b]						
Sampling Dates:						
Sample Size:	215					
Female	Percent of Sample	0.5	12.7	51.2	1.4	65.7
	Number in Sample	65	1,759	7,103	195	9,123
	Mean Length (mm) [c]	540.0	528.7	544.2	551.7	
	Standard Error	0.0	7.7	2.9	19.2	
Male	Percent of Sample	3.3	5.6	23.9	1.4	34.3
	Number in Sample	456	782	3,323	195	4,757
	Mean Length (mm) [c]	541.4	572.1	582.1	622.5	
	Standard Error	10.1	11.7	5.4	47.5	
Total	Percent of Sample	3.8	18.3	75.1	2.8	100.0
	Number in Sample	521	2,541	10,426	391	13,880
	Standard Error	180	367	410	157	

[a] Escapements are based on peak aerial survey counts.
[b] Age and sex composition, and length data was based on carcass samples.
[c] Length was from mid-eye to fork-of-tail.

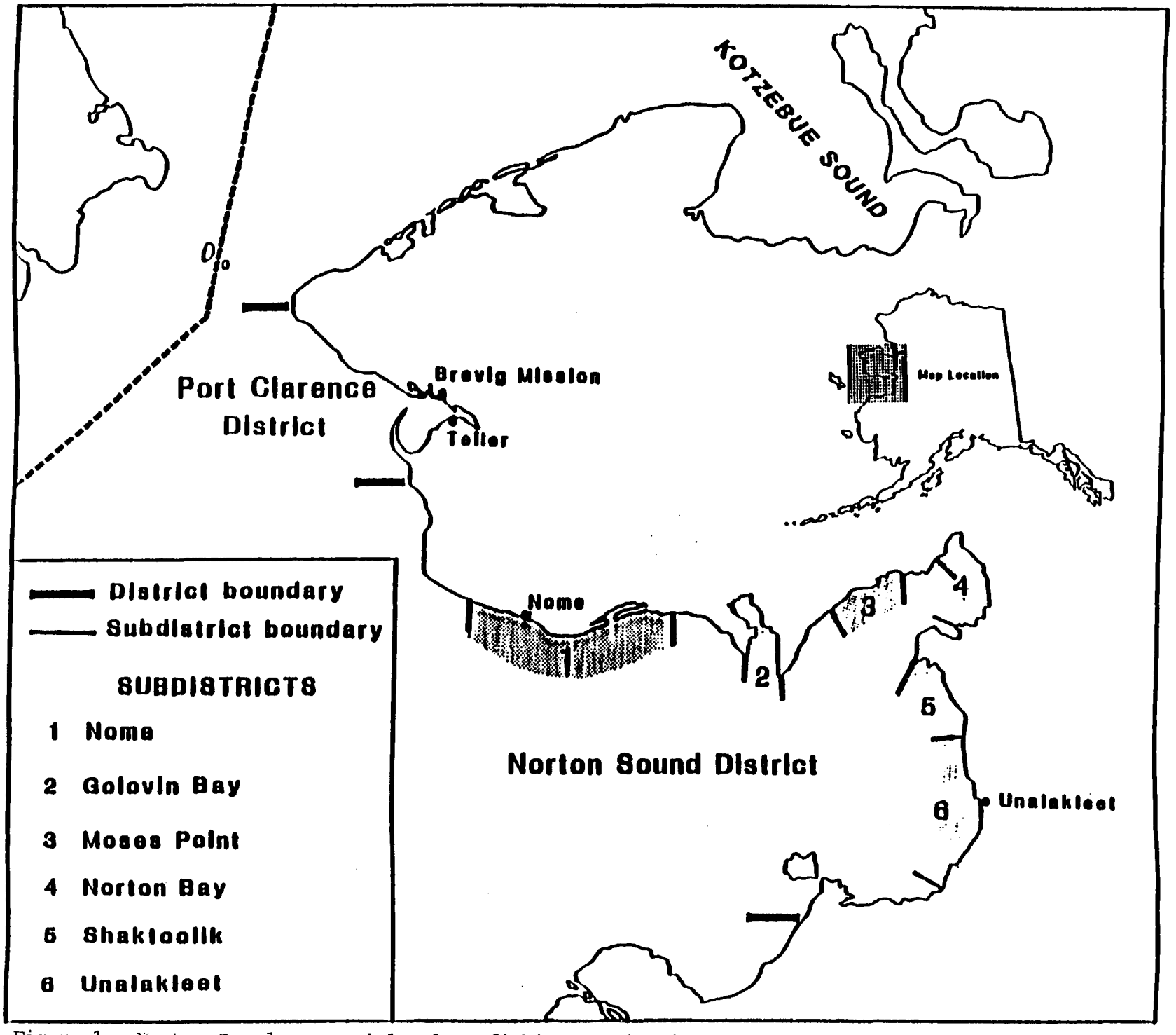

Figure 1. Norton Sound commercial salmon fishing subdistricts.

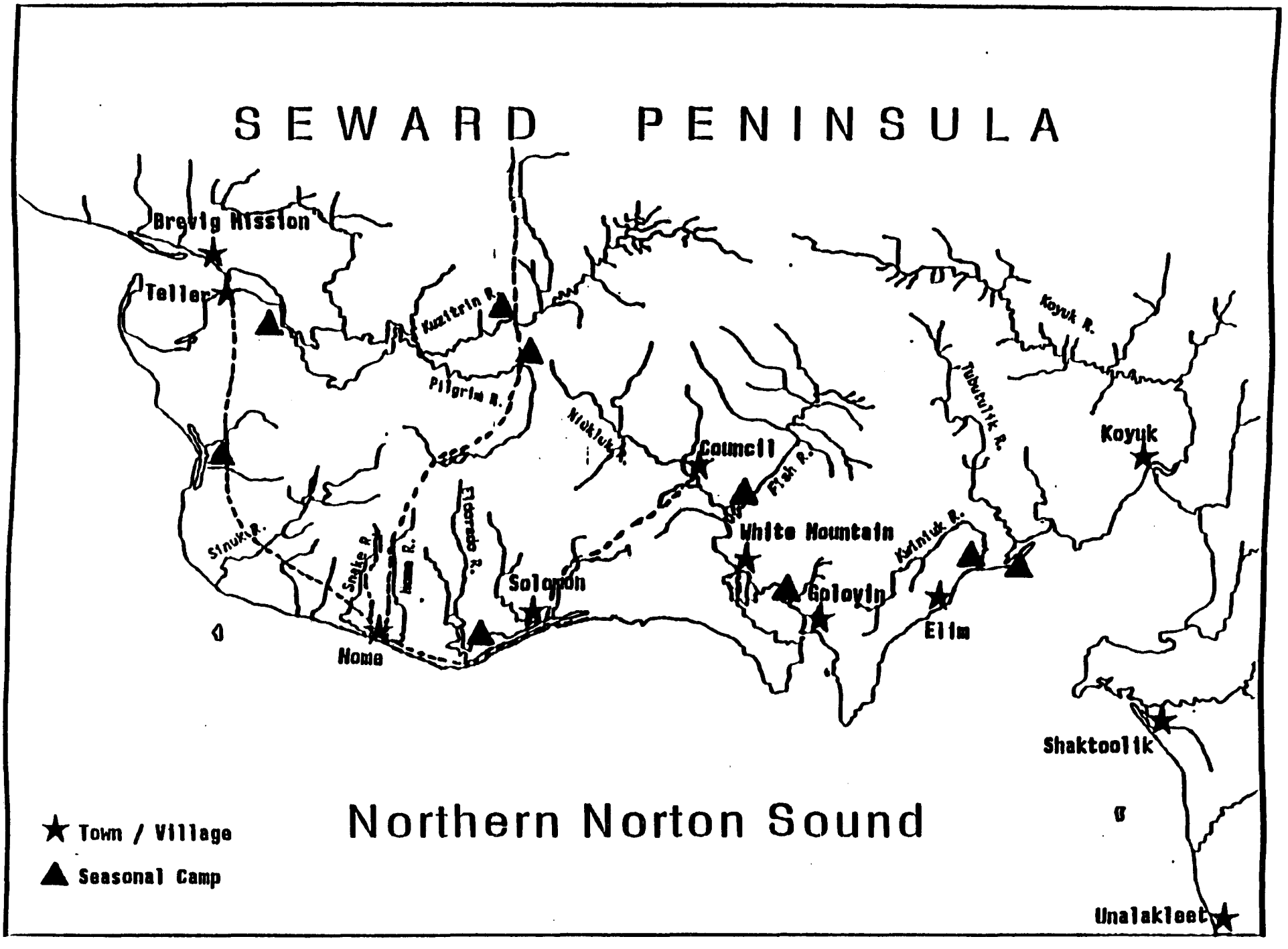

Figure 2. Northern Norton Sound subsistence fishing sites.

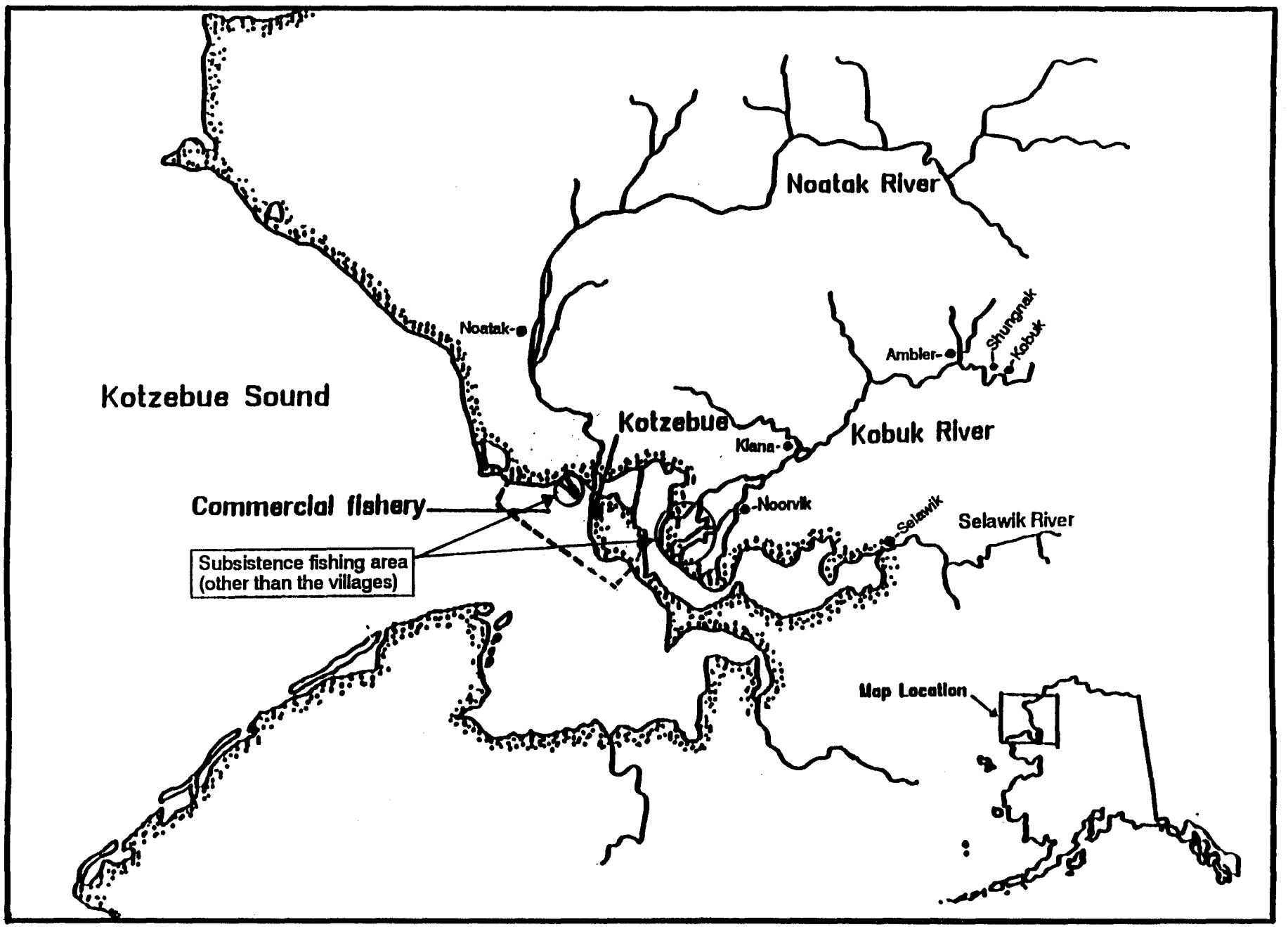

Figure 3. Kotzebue Sound commercial fishing district, villages and subsistence fishing areas, and major chum salmon spawning tributaries.

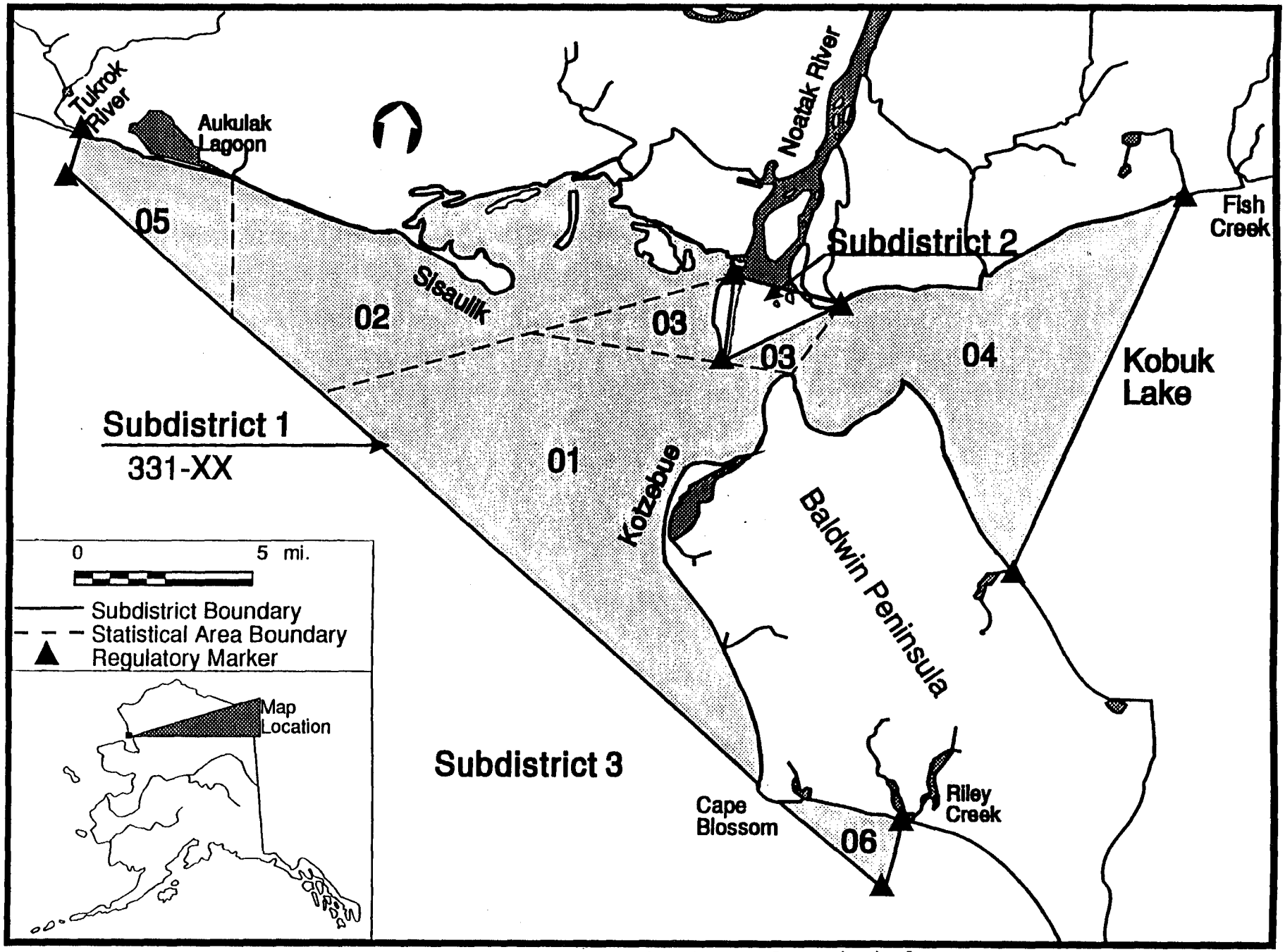

Figure 4. Kotzebue Sound commercial salmon fishing subdistricts and statistical areas.

Appendix Table A.1. Norton Sound Subdistrict 1 commercial salmon catch and effort by period, 1993.

Period Number	Period Dates	Hours Fished	Number of Fishermen [a]	Number of Salmon			
				Chinook	Sockeye	Chum	Coho
1	8/02–8/03	24	No fishing due to poor weather				
2	8/05–8/06	24	No fishing due to poor weather				
3	8/09–8/10	24	1	0	0	25	373
4	8/12–8/13	24	No fishing due to poor weather				
5	8/16–8/17	24	1	0	0	34	38
6	8/19–8/20	24	No fishing due to poor weather				
7	8/23–8/24	24	1	0	0	52	78
8	8/26–8/27	24	1	0	0	21	122
9	8/30–8/30	24	No fishing due to poor weather				
Season Total		216	1	0	0	132	611

[a] All salmon were sold as permitted under Catcher/Seller status.

Appendix Table A.2. Norton Sound Subdistrict 2 commercial salmon catch and effort by period, 1993.

Period Number	Period Dates	Hours Fished	Number of Fishermen	Number of Salmon				
				Chinook	Sockeye	Chum	Pink	Coho
1	7/13–7/14	24	4	0	1	290	885	0
2	7/16–7/17	36	8	0	3	1,357	3,559	0
3	7/22–7/23	24	7	1	0	1,156	4,036	2
Season Total		84	8	1	4	2,803	8,480	2

Appendix Table A.3. Norton Sound Subdistrict 3 commercial salmon catch and effort by period, 1993.

Period Number	Period Dates	Hours Fished	Number of Fishermen	Number of Salmon			
				Chinook	Sockeye	Chum	Coho [a]
1	8/06–8/07	24	16	1	2	41	537
2	8/10–8/12	48	21	2	1	77	1,921
3	8/17–8/18	24	18	0	0	35	879
4	8/26–8/27	24	13	0	1	14	728
Season Total		120	26	3	4	167	4,065

[a] Fishermen sold 2,608 pounds of coho roe which were recovered from the same fish reported in the commercial catch.

Appendix Table A.4. Norton Sound Subdistrict 4 commercial salmon catch and effort by period,

Period Number [a]	Period Dates	Hours Fished	Number of Fishermen	Number of Salmon		
				Chinook	Chum	Pink
1	6/17–6/18	24	6	31	1	
2	6/26–6/28	48	13	178	391	9
3	6/30–7/01	24	13	36	455	84
4	7/03–7/05	48	9	22	531	197
Season Total		144	15	267	1,378	290

Norton Bay subdistrict closed by emergency order on July 5 due to a lack of buyers in the area.

Appendix Table A.5. Norton Sound Subdistrict 5 commercial salmon catch and effort by period, 1993.

Period Number	Period Dates	Hours Fished	Number of Fishermen	Number of Salmon				
				Chinook	Sockeye	Chum	Pink	Coho
1	6/14–6/15	24	13	192		20	1	
2	6/17–6/18	24	18	464		161	72	
3	6/21–6/22	24	25	562		607	70	
4	6/24–6/26	48	29	886		2,096	904	
5	6/28–6/30	48	29	401		4,035	11,183	
6	7/01–7/03	48	28	152		4,610	2,990	
7	7/05–7/07	48	27	55		3,273	21,046	1
8	7/08–7/10	48	17	10	1	515	18,663	
9	7/11–7/12	36	19	8	1	631	34,014	
10	7/12–7/14	48	22	4		465	6,229	1
11	7/15–7/17	48	27	4	1	832	6,999	8
12	7/18–7/19	24	11			458	4,572	4
13	7/19–7/21	48	25	4	3	981		8
14	7/22–7/24	48	9	0	1	308		5
15	7/26–7/28		*Period Closure*					
16	7/29–7/31		*Period Closure*					
17	8/01–8/03	48	*No Buyer*					
18	8/04–8/06	48	15	1	2	441		1,406
19	8/08–8/10	48	16	7	4	711		2,446
20	8/11–8/13	48	19	4	3	523		4,146
21	8/15–8/17	48	14			81		494
22	8/18–8/20	48	*No fishing due to poor weather conditions*					
23	8/22–8/24	48	13	2	4	116		2,611
24	8/25–8/27	48		1	0	62		1,185
25	8/29–8/31	48	*No Buyer*					
26	9/01–9/03	48	*No Buyer*					
27	9/06–9/08	48	*No Buyer*					
Season Total		1,092	37	2,757	20	20,926	106,743	12,315

Appendix Table A.6. Norton Sound Subdistrict 6 commercial salmon catch and effort by period, 1993.

Period Number	Period Dates	Hours Fished	Number of Fishermen	Number of Salmon				
				Chinook	Sockeye	Chum	Pink	Coho
1	6/14–6/15	24	31	802	1	26		
2	6/17–6/18	24	41	543		40		
3	6/20–6/21	24	33	680		116		
4	6/24–6/26	48	47	1,682	1	498	1	1
5	6/28–6/30	48	48	1,076	11	3,602	9	
6	7/01–7/03	48	49	592	6	4,337	139	2
7	7/05–7/07	48	43	269	24	3,634	1,535	
8	7/08–7/10	48	34	99	8	2,196	1,246	2
9	7/11–7/12	24	18	8	7	620	11,703	1
10	7/12–7/14	48	28	43	19	1,393	7,684	8
11	7/15–7/17	48	29	44	57	3,212	9,029	30
12	7/18–7/19	24	8	4	7	554	6,417	24
13	7/19–7/21	48	33	22	18	2,252	2,516	74
14	7/22–7/24	48	26	21	13	2,309	1,782	156
15	8/01–8/03	48	6	3	4	140		92
16	8/04–8/06	48	32	9	20	986		2,047
17	8/08–8/10	48	38	9	21	636		4,790
18	8/11–8/13	48	42	13	12	608		4,403
19	8/15–8/17	48	30	7	5	372		3,401
20	8/18–8/20	48	12	1	5	98		880
21	8/22–8/24	48	21	5	4	202		2,141
22	8/25–8/27	48	21	6	3	165		2,263
23	8/29–8/31	48	20	4	3	73		3,359
24	9/01–9/03	48	19	1	2	70		1,814
25	9/06–9/08	48	15	1		17		802
Season Total		1,080	66	5,944	251	28,156	42,061	26,290

Appendix Table B.1. Norton Sound Subdistrict 6 chum salmon commercial catch sample age and sex composition by time period, 1993.

		Brood Year and (Age Group)				
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	Total
Stratum Dates:	6/14 – 7/03	Periods 1–6				
Sampling Dates:	6/30 – 7/03					
Sample Size:	78					
Female	Percent of Sample	0.0	6.4	30.8	11.5	48.7
	Number in Catch	0	553	2,652	995	4,199
Male	Percent of Sample	0.0	20.5	24.4	6.4	51.3
	Number in Catch	0	1,768	2,100	553	4,420
Total	Percent of Sample	0.0	26.9	55.1	17.9	100.0
	Number in Catch	0	2,321	4,752	1,547	8,619
	Standard Error	0	436	489	377	
Stratum Dates:	7/04 – 7/14	Periods 7–10				
Sampling Dates:	7/04 – 7/14					
Sample Size:	177					
Female	Percent of Sample	0.6	15.3	29.9	7.3	53.1
	Number in Catch	44	1,196	2,348	576	4,165
Male	Percent of Sample	0.0	18.1	25.4	3.4	46.9
	Number in Catch	0	1,418	1,994	266	3,678
Total	Percent of Sample	0.6	33.3	55.4	10.7	100.0
	Number in Catch	44	2,614	4,342	842	7,843
	Standard Error	44	279	294	183	
Stratum Dates:	7/15 – 7/24	Periods 11–14				
Sampling Dates:	7/15 – 7/23					
Sample Size:	137					
Female	Percent of Sample	0.0	17.5	21.9	5.8	45.3
	Number in Catch	0	1,459	1,823	486	3,768
Male	Percent of Sample	0.7	22.6	27.7	3.6	54.7
	Number in Catch	61	1,884	2,310	304	4,559
Total	Percent of Sample	0.7	40.1	49.6	9.5	100.0
	Number in Catch	61	3,343	4,133	790	8,327
	Standard Error	61	350	357	209	

(continued)

Appendix Table B.1. (Page 2 of 2)

		Brood Year and (Age Group)				
		1989 (0.2)	1988 (0.3)	1987 (0.4)	1986 (0.5)	Total
Stratum Dates:	7/25 – 9/02	Periods 15–25				
Sampling Dates:	7/25 – 8/09					
Sample Size:	49					
Female	Percent of Sample	0.0	28.6	20.4	2.0	51.0
	Number in Catch	0	962	687	69	1,718
Male	Percent of Sample	0.0	16.3	26.5	6.1	49.0
	Number in Catch	0	550	893	206	1,649
Total	Percent of Sample	0.0	44.9	46.9	8.2	100.0
	Number in Catch	0	1,512	1,580	275	3,367
	Standard Error	0	242	243	133	
Stratum Dates:	6/14 – 9/02	Season Total (weighted)				
Sampling Dates:	6/30 – 8/09					
Sample Size:	441					
Female	Percent of Sample	0.2	14.8	26.7	7.5	49.2
	Number in Catch	44	4,170	7,511	2,126	13,850
Male	Percent of Sample	0.2	20.0	25.9	4.7	50.8
	Number in Catch	61	5,620	7,296	1,328	14,306
Total	Percent of Sample	0.4	34.8	52.6	12.3	100.0
	Number in Catch	105	9,790	14,807	3,454	28,156
	Standard Error	82	639	670	440	

Appendix Table B.2. Unalakleet River chum salmon test gillnet catch age and sex composition by time period, 1993.

		Brood Year and (Age Group)				
		1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	6/08 – 6/30					
Sampling Dates:	6/08 – 6/30					
Sample Size:	82					
Female	Percent of Sample	1.2	18.3	17.1	0.0	36.6
	Number in Catch	1	15	14	0	30
Male	Percent of Sample	17.1	34.1	12.2	0.0	63.4
	Number in Catch	14	28	10	0	52
Total	Percent of Sample	18.3	52.4	29.3	0.0	100.0
	Number in Catch	15	43	24	0	82
	Standard Error	4	5	4	0	
Stratum Dates:	7/01 – 7/31					
Sampling Dates:	7/01 – 7/31					
Sample Size:	125					
Female	Percent of Sample	11.2	9.6	5.6	0.8	27.2
	Number in Catch	14	12	7	1	34
Male	Percent of Sample	32.0	36.8	4.0	0.0	72.8
	Number in Catch	40	46	5	0	91
Total	Percent of Sample	43.2	46.4	9.6	0.8	100.0
	Number in Catch	54	58	12	1	125
	Standard Error	6	6	3	1	
Stratum Dates:	8/01 – 9/02					
Sampling Dates:	8/01 – 9/02					
Sample Size:	117					
Female	Percent of Sample	12.0	24.8	2.6	0.0	39.3
	Number in Catch	14	29	3	0	46
Male	Percent of Sample	30.8	25.6	4.3	0.0	60.7
	Number in Catch	36	30	5	0	71
Total	Percent of Sample	42.7	50.4	6.8	0.0	100.0
	Number in Catch	50	59	8	0	117
	Standard Error	5	5	3	0	

(continued)

Appendix Table B.2. (Page 2 of 2)

		Brood Year and (Age Group)				
		1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	6/08 – 9/02	Season Total (weighted)				
Sampling Dates:	6/08 – 9/02					
Sample Size:	324					
Female	Percent of Sample	9.0	17.3	7.4	0.3	34.0
	Number in Catch	29	56	24	1	110
Male	Percent of Sample	27.8	32.1	6.2	0.0	66.0
	Number in Catch	90	104	20	0	214
Total	Percent of Sample	36.7	49.4	13.6	0.3	100.0
	Number in Catch	119	160	44	1	324
	Standard Error	9	9	6	1	

Appendix Table C.1. Kwiniuk River tower expanded daily and cumulative counts of pink, chum, and chinook salmon, 1993.

	Pink Salmon		Chum Salmon		Chinook Salmon	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.
23–Jun	0	0	7	7	0	0
24–Jun	0	0	(2)	5	0	0
25–Jun	2	2	12	17	2	2
26–Jun	6	8	334	351	12	14
27–Jun	4	12	112	463	16	30
28–Jun	5	17	122	585	2	32
29–Jun	0	17	(22)	563	(2)	30
30–Jun	52	69	724	1,287	16	46
01–Jul	10	79	172	1,459	12	58
02–Jul	162	241	852	2,311	39	97
03–Jul	139	380	965	3,276	32	129
04–Jul	109	489	581	3,857	17	146
05–Jul	79	568	197	4,054	33	179
06–Jul	126	694	603	4,657	2	181
07–Jul	145	839	669	5,326	68	249
08–Jul	103	942	306	5,632	41	290
09–Jul	45	987	111	5,743	28	318
10–Jul	376	1,363	1,815	7,558	39	357
11–Jul	716	2,080	1,556	9,114	40	397
12–Jul	1,055	3,135	1,298	10,412	84	481
13–Jul	4,155	7,290	1,476	11,887	42	523
14–Jul	1,778	9,068	775	12,662	11	534
15–Jul	526	9,594	339	13,001	14	548
16–Jul	300	9,894	85	13,086	(4)	544
17–Jul	533	10,427	183	13,269	6	550
18–Jul	3,419	13,846	443	13,712	6	556
19–Jul	6,304	20,150	702	14,414	27	583
20–Jul	4,572	24,722	297	14,711	6	589
21–Jul	4,824	29,546	279	14,990	2	591
22–Jul	5,269	34,815	250	15,240	2	593
23–Jul	2,228	37,043	180	15,420	6	599
24–Jul	938	37,981	87	15,507	(2)	597
25–Jul	1,419	39,401	99	15,606	0	597
26–Jul	1,899	41,300	111	15,717	1	598
27–Jul	1,765	43,065	106	15,823	2	600

Appendix Table C.2. Nome River tower expanded daily and cumulative counts of chinook, chum, pink, and coho salmon, and Dolly Varden, 1993.

	Chinook Salmon		Chum Salmon		Pink Salmon		Coho Salmon		Dolly Varden	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
25-Jul	4	4	26	26	24	24	0	0		
26-Jul	2	6	58	84	154	178	0	0		
27-Jul	2	8	94	178	140	318	62	62		
28-Jul	0	8	56	234	90	408	8	70		
29-Jul	6	14	44	278	1,190	1,598	56	126		
30-Jul	0	14	18	296	976	2,574	47	173		
31-Jul	0	14	18	314	1,720	4,294	27	200		
01-Aug	5	19	161	475	1,646	5,940	183	383		
02-Aug	10	29	304	779	1,572	7,512	340	723		
03-Aug	0	29	12	791	99	7,611	6	729		
04-Aug	10	39	79	870	1,530	9,141	127	856		
05-Aug	5	44	99	969	370	9,511	373	1,229	17	17
06-Aug	0	44	198	1,167	310	9,821	292	1,521	28	45
07-Aug	0	44	90	1,257	86	9,907	58	1,579	19	64
08-Aug	0	44	128	1,385	470	10,377	607	2,186	56	120
09-Aug	0	44	166	1,551	854	11,231	1156	3,342	94	214
10-Aug	2	46	8	1,559	80	11,311	84	3,426	83	297
11-Aug	2	48	18	1,577	398	11,709	86	3,512	62	359
12-Aug	2	50	0	1,577	57	11,766	10	3,522	105	464
13-Aug	0	50	8	1,585	162	11,928	6	3,528	50	514
14-Aug	0	50	4	1,589	209	12,137	14	3,542	60	574
15-Aug	0	50	28	1,617	185	12,322	44	3,586	0	574
16-Aug	0	50	52	1,669	162	12,484	74	3,660	40	614
17-Aug	0	50	48	1,717	107	12,591	44	3,704	30	644
18-Aug	0	50	58	1,775	184	12,775	32	3,736	78	722
19-Aug	0	50	12	1,787	70	12,845	24	3,760	42	764
20-Aug	0	50	23	1,810	91	12,936	46	3,806	62	826
21-Aug	1	51	16	1,826	60	12,996	44	3,850	68	894
22-Aug	0	51	8	1,834	41	13,037	89	3,939	73	967
23-Aug	4	55	4	1,838	(16)	13,021	42	3,981	98	1,065
24-Aug	0	55	14	1,852	2	13,023	18	3,999	37	1,102
25-Aug	0	55	5	1,857	3	13,026	42	4,041	77	1,179
26-Aug	0	55	(2)	1,855	10	13,036	37	4,078	48	1,227
27-Aug	4	59	2	1,857	2	13,038	201	4,279	27	1,254
28-Aug	4	63	2	1,859	(2)	13,036	70	4,349	98	1,352

Appendix Table D.1. Kotzebue District chum salmon commercial catch age and sex composition by fishing period, with season summaries of the commercial season, commercial test samples and all samples combined, 1993.

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	7/08 – 7/09		Period 1				
Sampling Dates:	7/09						
Sample Size:	254						
Female	Percent of Sample	0.0	5.9	41.3	3.9	0.0	51.2
	Number in Catch	0	120	838	80	0	1,037
Male	Percent of Sample	0.0	6.7	37.4	4.7	0.0	48.8
	Number in Catch	0	136	758	96	0	990
Total	Percent of Sample	0.0	12.6	78.7	8.7	0.0	100.0
	Number in Catch	0	255	1,596	176	0	2,027
	Standard Error	0	42	52	36	0	
Stratum Dates:	7/12 – 7/13		Period 2				
Sampling Dates:	7/13						
Sample Size:	274						
Female	Percent of Sample	0.4	10.6	38.3	6.6	0.4	56.2
	Number in Catch	16	454	1,642	281	16	2,408
Male	Percent of Sample	0.0	9.5	29.2	4.7	0.4	43.8
	Number in Catch	0	407	1,251	203	16	1,877
Total	Percent of Sample	0.4	20.1	67.5	11.3	0.7	100.0
	Number in Catch	16	860	2,893	485	31	4,285
	Standard Error	16	104	121	82	22	
Stratum Dates:	7/15 – 7/16		Period 3				
Sampling Dates:	7/16						
Sample Size:	266						
Female	Percent of Sample	0.0	5.3	30.8	2.6	0.4	39.1
	Number in Catch	0	432	2,529	216	31	3,208
Male	Percent of Sample	0.0	13.2	43.2	4.1	0.4	60.9
	Number in Catch	0	1,080	3,547	339	31	4,997
Total	Percent of Sample	0.0	18.4	74.1	6.8	0.8	100.0
	Number in Catch	0	1,511	6,077	555	62	8,205
	Standard Error	0	195	221	127	44	

(continued)

Appendix Table D.1. (Page 2 of 6)

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	7/19 – 7/20		Period 4				
Sampling Dates:	7/20						
Sample Size:	270						
Female	Percent of Sample	0.0	3.3	35.2	2.6	0.0	41.1
	Number in Catch	0	252	2,664	196	0	3,113
Male	Percent of Sample	1.1	8.1	45.6	3.7	0.4	58.9
	Number in Catch	84	617	3,449	280	28	4,459
Total	Percent of Sample	1.1	11.5	80.7	6.3	0.4	100.0
	Number in Catch	84	869	6,114	477	28	7,572
	Standard Error	48	147	182	112	28	
Stratum Dates:	7/22 – 7/23		Period 5				
Sampling Dates:	7/23						
Sample Size:	272						
Female	Percent of Sample	0.0	5.9	34.9	2.6	0.0	43.4
	Number in Catch	0	451	2,675	197	0	3,323
Male	Percent of Sample	0.4	11.0	43.4	1.8	0.0	56.6
	Number in Catch	28	845	3,323	141	0	4,336
Total	Percent of Sample	0.4	16.9	78.3	4.4	0.0	100.0
	Number in Catch	28	1,295	5,998	338	0	7,659
	Standard Error	28	174	192	96	0	
Stratum Dates:	7/27		Commercial Test Fish Sample (Period 6)				
Sampling Dates:	7/27						
Sample Size:	269						
Female	Percent of Sample	0.7	8.2	34.6	1.5	0.0	45.0
	Number in Sample	2	22	93	4	0	121
Male	Percent of Sample	1.1	10.0	40.9	3.0	0.0	55.0
	Number in Sample	3	27	110	8	0	148
Total	Percent of Sample	1.9	18.2	75.5	4.5	0.0	100.0
	Number in Sample	5	49	203	12	0	269
	Standard Error	2	6	7	3	0	

(continued)

Appendix Table D.1. (Page 3 of 6)

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	7/29 – 7/30		Period 7				
Sampling Dates:	7/30						
Sample Size:	275						
Female	Percent of Sample	0.7	11.6	35.3	2.5	0.0	50.2
	Number in Catch	104	1,665	5,047	364	0	7,181
Male	Percent of Sample	2.2	13.8	31.6	1.8	0.4	49.8
	Number in Catch	312	1,977	4,527	260	52	7,128
Total	Percent of Sample	2.9	25.5	66.9	4.4	0.4	100.0
	Number in Catch	416	3,642	9,574	624	52	14,309
	Standard Error	145	377	407	177	52	
Stratum Dates:	8/03		Commercial Test Fish Sample (Period 8)				
Sampling Dates:	8/03						
Sample Size:	275						
Female	Percent of Sample	0.7	15.6	34.5	0.4	0.0	51.3
	Number in Sample	2	43	95	1	0	141
Male	Percent of Sample	1.5	11.3	33.8	2.2	0.0	48.7
	Number in Sample	4	31	93	6	0	134
Total	Percent of Sample	2.2	26.9	68.4	2.5	0.0	100.0
	Number in Sample	6	74	188	7	0	275
	Standard Error	2	7	8	3	0	
Stratum Dates:	8/05 – 8/06		Period 9				
Sampling Dates:	8/06						
Sample Size:	259						
Female	Percent of Sample	0.8	10.0	38.2	1.5	0.0	50.6
	Number in Catch	209	2,712	10,326	417	0	13,663
Male	Percent of Sample	0.8	12.4	35.1	1.2	0.0	49.4
	Number in Catch	209	3,338	9,491	313	0	13,351
Total	Percent of Sample	1.5	22.4	73.4	2.7	0.0	100.0
	Number in Catch	417	6,049	19,817	730	0	27,014
	Standard Error	207	701	743	273	0	

(continued)

Appendix Table D.1. (Page 4 of 6)

			Brood Year and (Age Group)					
			1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:		8/10	Commercial Test Fish Sample (Period 10)					
Sampling Dates:		8/10						
Sample Size:		271						
Female	Percent of Sample		1.1	21.8	30.3	1.1	0.0	54.2
	Number in Sample		3	59	82	3	0	147
Male	Percent of Sample		4.8	17.3	22.1	1.5	0.0	45.8
	Number in Sample		13	47	60	4	0	124
Total	Percent of Sample		5.9	39.1	52.4	2.6	0.0	100.0
	Number in Sample		16	106	142	7	0	271
	Standard Error		4	8	8	3	0	
Stratum Dates:		8/13	Commercial Test Fish Sample (Period 11)					
Sampling Dates:		8/13						
Sample Size:		157						
Female	Percent of Sample		1.3	22.3	29.3	0.6	0.0	53.5
	Number in Sample		2	35	46	1	0	84
Male	Percent of Sample		0.6	20.4	24.8	0.6	0.0	46.5
	Number in Sample		1	32	39	1	0	73
Total	Percent of Sample		1.9	42.7	54.1	1.3	0.0	100.0
	Number in Sample		3	67	85	2	0	157
	Standard Error		2	6	6	1	0	
Stratum Dates:		8/17	Commercial Test Fish Sample (Period 12)					
Sampling Dates:		8/17						
Sample Size:		270						
Female	Percent of Sample		3.3	19.6	30.4	0.7	0.0	54.1
	Number in Sample		9	53	82	2	0	146
Male	Percent of Sample		1.9	17.0	25.6	1.5	0.0	45.9
	Number in Sample		5	46	69	4	0	124
Total	Percent of Sample		5.2	36.7	55.9	2.2	0.0	100.0
	Number in Sample		14	99	151	6	0	270
	Standard Error		4	8	8	2	0	

(continued)

Appendix Table D.1. (Page 5 of 6)

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	8/20	Commercial Test Fish Sample (Period 13)					
Sampling Dates:	8/20						
Sample Size:	75						
Female	Percent of Sample	4.0	26.7	28.0	1.3	0.0	60.0
	Number in Sample	3	20	21	1	0	45
Male	Percent of Sample	8.0	13.3	18.7	0.0	0.0	40.0
	Number in Sample	6	10	14	0	0	30
Total	Percent of Sample	12.0	40.0	46.7	1.3	0.0	100.0
	Number in Sample	9	30	35	1	0	75
	Standard Error	3	4	4	1	0	
Stratum Dates:	8/24	Commercial Test Fish Sample (Period 14)					
Sampling Dates:	8/24						
Sample Size:	265						
Female	Percent of Sample	0.8	18.5	23.8	0.0	0.0	43.0
	Number in Sample	2	49	63	0	0	114
Male	Percent of Sample	4.2	20.4	32.1	0.4	0.0	57.0
	Number in Sample	11	54	85	1	0	151
Total	Percent of Sample	4.9	38.9	55.8	0.4	0.0	100.0
	Number in Sample	13	103	148	1	0	265
	Standard Error	4	8	8	1	0	
Stratum Dates:	8/27	Commercial Test Fish Sample (Period 15)					
Sampling Dates:	8/27						
Sample Size:	255						
Female	Percent of Sample	4.7	22.4	25.9	0.4	0.0	53.3
	Number in Sample	12	57	66	1	0	136
Male	Percent of Sample	4.3	19.6	22.7	0.0	0.0	46.7
	Number in Sample	11	50	58	0	0	119
Total	Percent of Sample	9.0	42.0	48.6	0.4	0.0	100.0
	Number in Sample	23	107	124	1	0	255
	Standard Error	5	8	8	1	0	

(continued)

Appendix Table D.1. (Page 6 of 6)

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:		Periods 1–5, 7 & 9					
Sampling Dates:							
Sample Size:	1,870						
Female	Percent of Sample	0.5	8.6	36.2	2.5	0.1	47.7
	Number in Catch	328	6,085	25,722	1,752	46	33,933
Male	Percent of Sample	0.9	11.8	37.1	2.3	0.1	52.2
	Number in Catch	633	8,398	26,347	1,633	127	37,138
Total	Percent of Sample	1.4	20.4	73.3	4.8	0.2	100.0
	Number in Catch	961	14,483	52,068	3,385	173	71,071
	Standard Error	190	662	728	350	76	
Stratum Dates:		Commercial Test Fish Sample Summary					
Sampling Dates:							
Sample Size:	1,837						
Female	Percent of Sample	1.9	18.4	29.8	0.7	0.0	50.8
	Number in Sample	35	338	548	13	0	934
Male	Percent of Sample	2.9	16.2	28.7	1.3	0.0	49.2
	Number in Sample	54	297	528	24	0	903
Total	Percent of Sample	4.8	34.6	58.6	2.0	0.0	100.0
	Number in Sample	89	635	1,076	37	0	1,837
	Standard Error	9	20	21	6	0	
Stratum Dates:	7/08–8/27	Commercial fishing and commercial test fish					
Sampling Dates:	7/09–8/27	samples combined.					
Sample Size:	3,707						
Female	Percent of Sample	1.1	12.9	33.1	2.0	0.1	49.1
	Number in Sample	40	479	1,226	73	2	1,820
Male	Percent of Sample	1.8	13.4	33.4	2.2	0.1	50.9
	Number in Sample	66	497	1,237	83	4	1,887
Total	Percent of Sample	2.9	26.3	66.4	4.2	0.2	100.0
	Number in Sample	106	976	2,463	156	6	3,707
	Standard Error	10	27	29	12	2	

Appendix Table D.2. Kobuk River chum salmon drift test fish catch age and sex composition by time period, 1993.

		Brood Year and (Age Group)				
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	Total
Stratum Dates:	7/12 – 7/16					
Sampling Dates:	7/12 – 7/16					
Sample Size:	129					
Female	Percent of Sample	0.0	7.8	26.4	3.1	37.2
	Number in Catch	0	10	34	4	48
Male	Percent of Sample	0.0	6.2	52.7	3.9	62.8
	Number in Catch	0	8	68	5	81
Total	Percent of Sample	0.0	14.0	79.1	7.0	100.0
	Number in Catch	0	18	102	9	129
	Standard Error	0	4	5	3	
Stratum Dates:	7/17 – 7/23					
Sampling Dates:	7/17 – 7/23					
Sample Size:	62					
Female	Percent of Sample	0.0	9.7	38.7	1.6	50.0
	Number in Catch	0	6	24	1	31
Male	Percent of Sample	0.0	14.5	32.3	3.2	50.0
	Number in Catch	0	9	20	2	31
Total	Percent of Sample	0.0	24.2	71.0	4.8	100.0
	Number in Catch	0	15	44	3	62
	Standard Error	0	3	4	2	
Stratum Dates:	7/24 – 7/30					
Sampling Dates:	7/24 – 7/30					
Sample Size:	58					
Female	Percent of Sample	0.0	17.2	27.6	1.7	46.6
	Number in Catch	0	10	16	1	27
Male	Percent of Sample	0.0	19.0	32.8	1.7	53.4
	Number in Catch	0	11	19	1	31
Total	Percent of Sample	0.0	36.2	60.3	3.4	100.0
	Number in Catch	0	21	35	2	58
	Standard Error	0	4	4	1	

(continued)

Appendix Table D.2. (Page 2 of 2)

		Brood Year and (Age Group)				
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	Total
Stratum Dates:	7/31 – 8/06					
Sampling Dates:	7/31 – 8/06					
Sample Size:	175					
Female	Percent of Sample	1.7	20.0	33.1	1.1	56.0
	Number in Catch	3	35	58	2	98
Male	Percent of Sample	2.3	16.0	25.7	0.0	44.0
	Number in Catch	4	28	45	0	77
Total	Percent of Sample	4.0	36.0	58.9	1.1	100.0
	Number in Catch	7	63	103	2	175
	Standard Error	3	6	7	1	
Stratum Dates:	8/07 – 8/12					
Sampling Dates:	8/07 – 8/12					
Sample Size:	38					
Female	Percent of Sample	0.0	15.8	23.7	0.0	39.5
	Number in Catch	0	6	9	0	15
Male	Percent of Sample	2.6	26.3	31.6	0.0	60.5
	Number in Catch	1	10	12	0	23
Total	Percent of Sample	2.6	42.1	55.3	0.0	100.0
	Number in Catch	1	16	21	0	38
	Standard Error	1	3	3	0	
Stratum Dates:	7/12 – 8/12	Season Total (weighted)				
Sampling Dates:	7/12 – 8/12					
Sample Size:	462					
Female	Percent of Sample	0.6	14.5	30.5	1.7	47.4
	Number in Catch	3	67	141	8	219
Male	Percent of Sample	1.1	14.3	35.5	1.7	52.6
	Number in Catch	5	66	164	8	243
Total	Percent of Sample	1.7	28.8	66.0	3.5	100.0
	Number in Catch	8	133	305	16	462
	Standard Error	3	10	10	4	

Appendix Table D.3. Noatak River chum salmon drift test fish catch age and sex composition by time period, 1993.

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	7/24 – 7/31						
Sampling Dates:	7/24 – 7/31						
Sample Size:	65						
Female	Percent of Sample	0.0	3.1	47.7	0.0	0.0	50.8
	Number in Catch	0	2	31	0	0	33
Male	Percent of Sample	0.0	9.2	38.5	1.5	0.0	49.2
	Number in Catch	0	6	25	1	0	32
Total	Percent of Sample	0.0	12.3	86.2	1.5	0.0	100.0
	Number in Catch	0	8	56	1	0	65
	Standard Error	0	3	3	1	0	
Stratum Dates:	8/01 – 8/06						
Sampling Dates:	8/01 – 8/06						
Sample Size:	155						
Female	Percent of Sample	0.0	13.0	48.7	1.3	0.0	63.0
	Number in Catch	0	20	75	2	0	98
Male	Percent of Sample	0.0	4.5	31.2	1.3	0.0	37.0
	Number in Catch	0	7	48	2	0	57
Total	Percent of Sample	0.0	17.5	79.9	2.6	0.0	100.0
	Number in Catch	0	27	124	4	0	155
	Standard Error	0	5	5	2	0	
Stratum Dates:	8/07–8/14						
Sampling Dates:	8/07–8/14						
Sample Size:	172						
Female	Percent of Sample	4.1	18.0	32.0	0.6	0.6	55.2
	Number in Catch	7	31	55	1	1	95
Male	Percent of Sample	0.6	18.6	23.3	1.7	0.6	44.8
	Number in Catch	1	32	40	3	1	77
Total	Percent of Sample	4.7	36.6	55.2	2.3	1.2	100.0
	Number in Catch	8	63	95	4	2	172
	Standard Error	3	6	7	2	1	

(continued)

Appendix Table D.3. (Page 2 of 3)

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	8/15 – 8/21						
Sampling Dates:	8/15 – 8/21						
Sample Size:	205						
Female	Percent of Sample	1.5	22.4	33.2	1.0	0.0	58.0
	Number in Catch	3	46	68	2	0	119
Male	Percent of Sample	3.4	14.6	23.4	0.5	0.0	42.0
	Number in Catch	7	30	48	1	0	86
Total	Percent of Sample	4.9	37.1	56.6	1.5	0.0	100.0
	Number in Catch	10	76	116	3	0	205
	Standard Error	3	7	7	2	0	
Stratum Dates:	8/22 – 8/28						
Sampling Dates:	8/22 – 8/28						
Sample Size:	175						
Female	Percent of Sample	1.7	22.9	28.6	0.0	0.0	53.1
	Number in Catch	3	40	50	0	0	93
Male	Percent of Sample	2.3	18.3	24.0	1.7	0.6	46.9
	Number in Catch	4	32	42	3	1	82
Total	Percent of Sample	4.0	41.1	52.6	1.7	0.6	100.0
	Number in Catch	7	72	92	3	1	175
	Standard Error	3	7	7	2	1	
Stratum Dates:	8/29 – 9/04						
Sampling Dates:	8/29 – 9/04						
Sample Size:	134						
Female	Percent of Sample	6.7	24.6	26.1	0.7	0.0	58.2
	Number in Catch	9	33	35	1	0	78
Male	Percent of Sample	3.0	16.4	22.4	0.0	0.0	41.8
	Number in Catch	4	22	30	0	0	56
Total	Percent of Sample	9.7	41.0	48.5	0.7	0.0	100.0
	Number in Catch	13	55	65	1	0	134
	Standard Error	3	6	6	1	0	

(continued)

Appendix Table D.3. (Page 3 of 3)

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates:	9/05 – 9/13						
Sampling Dates:	9/05 – 9/13						
Sample Size:	50						
Female	Percent of Sample	12.0	32.0	22.0	0.0	0.0	66.0
	Number in Catch	6	16	11	0	0	33
Male	Percent of Sample	4.0	20.0	8.0	2.0	0.0	34.0
	Number in Catch	2	10	4	1	0	17
Total	Percent of Sample	16.0	52.0	30.0	2.0	0.0	100.0
	Number in Catch	8	26	15	1	0	50
	Standard Error	3	4	3	1	0	
Stratum Dates:	7/24 – 9/13	Season Total (weighted)					
Sampling Dates:	7/24 – 9/13						
Sample Size:	956						
Female	Percent of Sample	2.9	19.7	34.0	0.6	0.1	57.4
	Number in Catch	28	188	325	6	1	549
Male	Percent of Sample	1.9	14.5	24.8	1.2	0.2	42.6
	Number in Catch	18	139	237	11	2	407
Total	Percent of Sample	4.8	34.2	58.9	1.8	0.3	100.0
	Number in Catch	46	327	563	17	3	956
	Standard Error	7	15	15	4	2	

OEO/ADA STATEMENT

The Alaska Department of fish and Game administers all programs and activities free from discrimination on the basis of sex, color, race, religion, national origin, age, marital status, pregnancy, parenthood or disability. For information on alternative formats available for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-4120, or (TDD) 907-465-3646. Any person who believes s/he has been discriminated against should write to:

ADF&G
P.O. Box 25526
Juneau, AK 99802-5526

or

O.E.O.
U.S. Department of Interior
Washington, D.C. 20240